Name: _____ Date: _____ Period: _____

Unit 7, Part 3 Notes: The Endocrine System

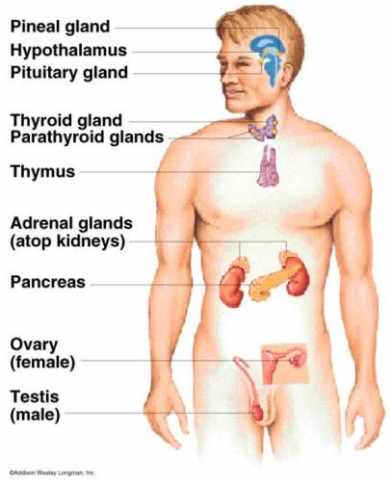
Ms. Ottolini, AP Biology

What is the overall function of the endocrine system?

- Sending signals (via hormones) through the bloodstream to induce a response in target organs, tissues, and cells
- Hormone molecules = chemical messenger molecules
- Effects of hormone molecules include:
    1. Successful growth and development
    2. Successful reproduction
    3. Regulation of metabolism
    4. Proper responses to environmental changes (ex: temperature, dehydration)

What are glands and how are they related to the endocrine system?

- Glands are tissues that secrete substances into a particular location in the body
    1. Exocrine glands (not part of the endocrine system): secrete products into ducts which open into cavities in organs (ex: sweat and oil glands, digestive glands)
    2. Endocrine glands secrete hormones into the bloodstream. Endocrine glands include the hypothalamus (in brain), pituitary (in brain), thyroid (in neck), adrenal (on top of kidney), \
    3. Organs that can secrete hormones but are not considered glands include the pancreas, ovaries, testes, kidney, stomach, small intestine b/c making hormones is not their main job



What are the types of hormone molecules?

- Steroids (ex: testosterone and estrogen): have a similar structure to a cholesterol molecule ; they are fat-soluble (aka non-polar) so they CAN pass through the cell membrane
- Amines (ex: epinephrine): modified from the amino acid tyrosine ; they are water-soluble (aka polar) so they CANNOT pass through the cell membrane
- Full Proteins or Single Polypeptides (ex: oxytocin… used to induce labor): vary in size ; they are water soluble so they CANNOT pass through the cell membrane

Note: Non-steroid (water soluble) hormones cannot enter the cell so they have to bind to receptors on the plasma membrane, which activate chemical signals called second messengers (ex: cyclic AMP) to produce a particular cell response. This is a signal transduction pathway, which consists of three parts: reception, transduction, and response!

Questions:

1. Why would being non-polar allow steroid hormones to move through the cell membrane?

They can pass through the nonpolar tail region of the cell membrane

2. What type of receptors would steroid hormones bind to (options = plasma membrane receptors or intracellular receptors)?

Intracellular Receptors

3. Why would being polar prevent amine/protein hormones from moving through the cell membrane?

They can't pass through the nonpolar tail region of the cell membrane.

4. What type of receptors would amine/protein hormones bind to (options = plasma membrane receptors or intracellular receptors)?

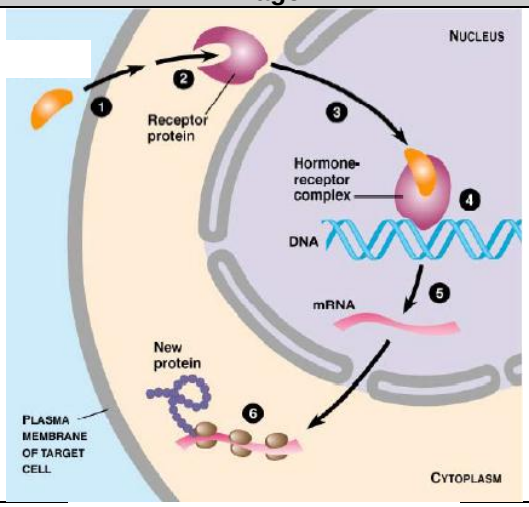
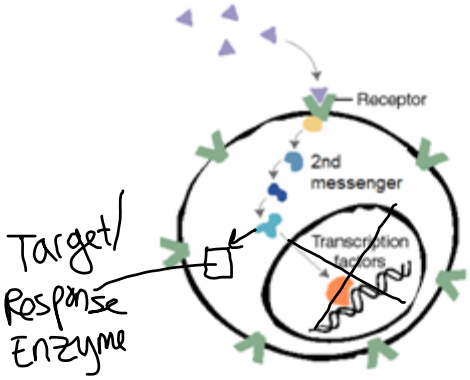
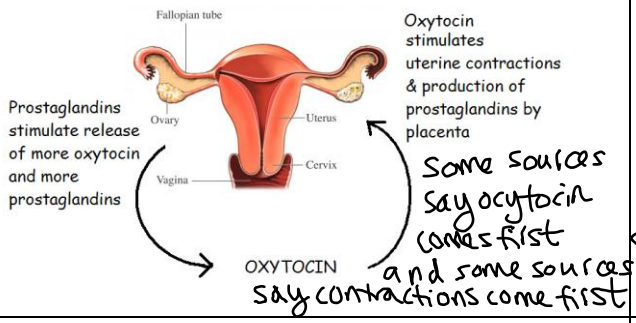
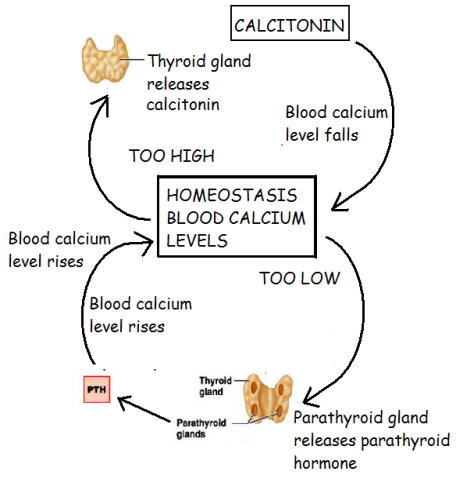
plasma Membrane Receptors

On a separate sheet of paper:

5. Page 950-951 – Explain the relationship between the hypothalamus and pituitary gland. How do they work together to regulate the concentration of water in the bloodstream and urine volume? Make sure to discuss antidiuretic hormone (ADH) and refer to figure 44.16 (left side) on page 937.

6. Page 789-791 – Describe the steps involved in de-etoliation (greening) in plants. Make sure to mention reception, transduction, and response in your answer and refer to Figure 39.4 on page 790.

Endocrine System Image Analysis

Image	Questions
	1. Describe what is occurring in each of the six steps shown in the image to the left. ① Hormone passes through membrane ② Hormone binds to intracellular receptor ③ Receptor enters Nucleus ④ Receptor turns on genes ⑤ DNA converted to messenger molecules (mRNA) ⑥ Response protein is made from the code in mRNA 2. What type of hormone is being used? How do you know? Steroid - can pass through the membrane
	3. Describe how this image is different from the previous image. Location of Receptor (on plasma membrane) second messengers used (during transduction) No Nuclear Response 4. What type of hormone is being used? How do you know? Amine or Protein hormone — cannot pass through the membrane
	5. Is the hormone oxytocin (involved in human labor) part of a negative or positive feedback loop? How do you know? Positive - Response increases Stimulus Summary - oxytocin → contractions → more oxytocin → stronger contractions OR contractions → oxytocin → stronger contractions → more oxytocin Some sources say ocytocin comes first and some sources say contractions come first
	6. Are the hormones calcitonin and parathyroid hormone part of a negative or positive feedback loop? How do you know? Negative - Response (ex: calcitonin) decreases stimulus (ex: high blood calcium) 7. Where does calcitonin store the excess calcium moved from the blood? In other words, what tissue in your body is primarily made of calcium? Bones